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MUSEUM NOTES.

(Notes on Specimens of Interest and upon Work done in the Pathological
Museum, McGill University.)

BY

MAUDE E. ABBOTT, B.A., M.D., Assistant Curator.

Reprinted from the Montreal Medical Journal, July, 1901.

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(Notes on Specimens of Interest and upon Work done in the Pathological Museum,
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UNIQUE CASE OF CONGENITAL MALFORMATION OF THE HEART?

Defect of the Interventricular Septum; Rudimentary Right Ventricle; Patent Foramen Ovale; Great Dilatation of Right Atricle and Right Auricular Appendage.

From a Case Reported by A. F. Holmes, M.D., Montreal, Lower Canada, in the *Transactions of the Medico-Chirurgical Society of Edinburgh*, 1824.

This specimen which presents a condition of great pathological rarity as well as of clinical significance, is also most interesting to Montrealers and to those at McGill from a historical point of view. For the name of Dr. Andrew Holmes is well-known to most of us as that of one of the four medical men who, in 1824, initiated courses of lectures for medical students in this City, which, in 1828, became incorporated as the Medical Faculty of McGill University. The incorporation of the already fully organised medical school, securing to the College the bequest of its Founder.*

Dr. Holmes was also one of the pioneer founders of the Montreal General Hospital and was connected with that institution from his 26th year until his death in 1860. He with others founded the Natural History Society of Montreal, and was its first President.

Alfred Sandham, writing of the Holmes' Gold Medal in 1872, speaks as follows:—"The medal was founded by the Faculty of Medicine in 1864 in honor of the late Dean, Professor Holmes, than whom, it may be said, that no man ever lived more conscientiously and few have died more beloved. It is a most deserving and grateful tribute to the memory of departed worth, associated as it is with the name of one who was the Founder of the first medical school in Canada, and who for nearly forty years remained in connection therewith."

Dr. Holmes is said to have been a detailed and conscientious rather than a brilliant lecturer and he was an indefatigable student. The

* The bequest of the Hon. James McGill was to take effect on condition that there should be erected within ten years on the estate of Burs-side "A university or college for the purpose of education and the advancement of learning in this Province with a competent number of professors and teachers to render such establishment effectual and useful for the purpose intended."

scattered papers from his pen which I have been able to examine from the journals of the time, give evidence of this; they show deep research and a widespread interest extending far beyond the subject with which he deals. Indeed, he seems to have been a man of high scientific gifts, who left his mark upon his time in many directions. He was above all things a collector, was a botanist, mineralogist and geologist, and left behind him a valuable herbarium and collections of minerals which still form important parts of the Redpath Museum, and the Natural History Society Collections. In the Redpath Museum these formed part of the first nucleus of what is now one of the richest parts of the University. I find a note by the late Sir William Dawson, dated 1862, as follows:—

"The new Museum contains a general collection of Zoology, a general collection of Geology and Palaeontology, the *Holmes' Collection of 2,000 Canadian & Foreign minerals*, the *Holmes' Herbarium*, containing specimens of nearly all the plants indigenous to Lower Canada; the Logan collection of 450 characteristic Canadian fossils, and the Cooper collection of 2,400 Canadian insects."

In the Redpath Museum his mineralogical collection is not preserved as a whole, but the specimens are scattered, classified among others for teaching purposes. All are named however "*Holmes' Collection*" and carry the original label, a small yellow paper bearing the catalogue number Dr. Holmes gave them, written by himself. An extremely interesting catalogue for these specimens can be seen in the Museum. It is entirely in his own writing. It shows his wide knowledge of mineralogy and states the source and date at which the specimens were obtained.

The herbarium here is almost more interesting to us, for, from a catalogue edited by Professor James Barnston in 1854, but made out by Professor Holmes himself, the specimens all are seen to be from the immediate vicinity of Montreal, collected from 1821 to 1825 and representing in over 500 specimens almost the entire flora of this district. This collection is not scattered among others but is preserved intact as the *Holmes' Herbarium*.

Dr. Holmes graduated from the University of Edinburgh, in 1819, and the case before us was reported before the Edinburgh Medico-Chirurgical Society in 1823, when he was a young man of 26 and before he could have been four years in practice. Knowing his future it is very interesting to read this, which was probably his first paper of importance. On this ground I trust that the above apparent

digression from the pathological specimen forming the subject of this paper, will be pardoned.

This specimen had stood upon the shelves of the Pathological Museum for many years without a reference and its interesting history seemed to have passed beyond the ken of the present generation. Dr. Osler, however, in reply to an enquiry on the subject, stated that he remembered it perfectly, having even demonstrated it, and directed me to the Edinburgh Medical Journal in which he told me it had been reported by Dr. Holmes.

I take the liberty of republishing Dr. Holmes' article in toto, both because in itself it presents many points of interest to us of modern times and because it is so classically written that scarcely a word can be omitted without loss.

CASE OF MALFORMATION OF THE HEART.*

BY

A. F. HOLMES, M.D., Montreal, Lower Canada.

Communicated to the Medico-Chirurgical Society of Edinburgh, by Dr. Alison, March 5th, 1823.

The following case of malformation of the heart, is, I believe unique, as far as the appearances extend, though several, in which similar effects on the circulation must have been produced, are to be found recorded. Many of the cases collected by Dr. Farre in his Essay on Malformations of the Heart, resemble this in one or more particulars, but no one exactly. Though, from the existence of all the parts that are found in the natural state, it might be classed among cases of imperfect double heart, yet it may perhaps be more correctly considered intermediate between them and those of single heart, as from the relations and small capacity of the right ventricle, it can be looked upon only as the commencement of the pulmonary artery. The effects on the constitution of the blood would evidently be the same as if only one auricle and ventricle existed.

Isaac N., æt. 22, of a delicate habit, had been affected from infancy with a palpitation of the heart, attended by a peculiar blueness of the cheeks and lips, more remarkable at one time than another. The palpitation was much increased by quick motion, and subject to aggravation after any irregularity, which a turn for dissipation frequently presented. At these times the difficulty of respiration was great, and attended by pain in the region of the heart. For a few years past he had had a more severe attack every winter, apparently originating in

* Republished from the Trans. Medico-Chir. Society of Edinburgh, 1823.

intemperance, commencing with bilious vomiting and yielding to blood-letting, cathartics and antispasmodics. Less severe attacks occurred more frequently, in most of which abstraction of blood seemed of advantage. That which terminated his existence commenced on the 13th of January by vomiting, which continued for nearly 24 hours, greatly anxiety and oppression and violent pain about the precordia. He was unable to lie except in one position, on his back, inclining to the left side. Any attempt to lie on his right side was followed by a sense of pain and suffocation, which obliged him to change his posture. This inability of remaining on the right side was present even in health; and if, by accident, he turned during sleep, he was awakened by acute pain.

To relieve the urgency of the symptoms, blood was abstracted on the 14th. On the 15th and 18th a blister was applied to the chest and opiates, in combination with sulines and antispasmodics, were employed with but trifling relief. The tongue being much furred and skin hot, cathartics were used. These remedies were continued throughout the disease.

During its continuance it more than once appeared to yield, the patient getting comfortable sleep, and being free from pain, and the palpitation less annoying. The tongue became clean, but again furred towards the close; yellowness of the eyes and skin, and high colored urine, were more or less present during the progress of the complaint. Some time before his death, the feet began to swell, the oedema increased gradually, and was soon followed by fluctuation in the abdomen, and effusion in the chest. The presence of fluid in the pericardium was suspected from the patient being easy only while inclining forward, a symptom which appeared a few days before death, but became less prominent afterwards. At the same time a peculiar sound was occasionally heard, particularly when the ear was made to approach his breast, similar to that produced by bubbles of air entering a bottle full of water and frequent inclination to syncope, commonly induced by attempts to move, supervened.

The little probability of being of service, confined the practice in the latter part of the treatment to stimulants and anodynes, except that, in consequence of enlargement of the liver being perceived, sublimiate of mercury was conjoined. No specific effect followed its exhibition, but it appeared useful by acting on the bowels. Three days previous to the termination of the case, cough came on, attended by expectoration of mucus, at first mixed with blood.

On the 8th of February, he was evidently sinking; the palpitation constant, countenance very anxious and mind depressed, much oppress-

sion, respiration short, incapacity of raising the mucus from the trachea. He died early next morning.

The pulse throughout the disease was generally very irregular, sometimes intermitting, then full and bounding, followed by a tremulous motion of the artery; at other times it was regular but small. At the beginning of the disorder the pulse was at the wrist imperceptible, and continued so, with cold extremities, for several days. It was observed, that the arterial dilatations were occasionally not synchronous with the contraction of the heart, the latter having several pulsations in the interval of those of the artery without any regularity.

A remarkable circumstance attending the case was the apparent convalescence. On the 31st every symptom was aggravated, the effusion gaining ground, and there seemed little probability of his surviving many hours. To our surprise, however, on the first he was considerably relieved, and continued to improve; the oedema and swelling of the abdomen became stationary, and for three or four days there appeared a prospect of his recovery. This proved fallacious; the urine became scanty and high colored; the thighs, penis, and left arm oedematous and his abdomen larger. He suffered less, however, than at the commencement.

The body was examined in the presence of Messrs. Arnoldi, Caldwell, and Robertson, the two former of whom attended the case with me.

SECTIO CADAVERIS:—In examining the body externally, the lower extremities, parts of generation, and lower part of the abdomen were considerably swelled from effusion into the cellular membrane. On opening the abdominal cavity fluid of an orange color was collected, amounting to nearly a quart. The liver presented itself enlarged and hardened. The hardness was general, and extended through its substance, which, when cut into, appeared mottled with yellowish specks. The pyloric extremity of the stomach was lower than usual. A few of the glands at the root of the mesentery enlarged and hard; intestines healthy. Both sides of the thorax contained fluid, but not to a large amount. The pericardium occupied almost entirely the left cavity, the lungs being pressed into the upper and back parts; they were healthy except in containing fluid effused in their substance. Upon slitting up the pericardium, which contained from 3 to 4 ounces of serum, the heart came into view, generally enlarged, particularly the right auricle, the size of which was increased to the capacity of a pint.

When opened and cleared of the blood with which it was filled the muscular pectinatæ appeared remarkably strong. The interior rough and hard, apparently from earthy deposition, and giving a gritty feel when the knife was passed over it. The foramen ovale was pervious,

admitting easily the handle of the scalpel or the little finger. The aorta was then opened, and the section continued down into the ventricle. Its coats here and there were marked with yellow spots: the corpuscula Morgagni and two of the semilunar valves were red and increased in size. The parietes of the left ventricle were thinner than usual, and the cavity much larger than natural. Passing the finger into what appeared the opening between this ventricle and the left auricle, it passed by a large opening into the right auricle; and it was then found that there was no communication between the right auricle and left ventricle. The right ventricle was much less than natural. The pulmonary artery, of its natural size, passed from its upper end; the blood had found ingress into this ventricle from the left ventricle through an opening with tendinous margins, just below the semilunar valves of the aorta. Its size about half an inch by three-fourths of an inch. The praeternatural orifice between the right auricle and left ventricle was large, and furnished with valves similar to the tricuspid. Part of these were thickened and of a cartilaginous hardness. At the base of one of the divisions, there was a tumour of the size of a bean, containing a thickish yellow matter. The left auricle was partly concealed by the columnæ carneæ, and their tendinous terminations affixed to the valves just mentioned, and was a little enlarged but natural, as were the veins flowing into it.

The course of the circulation in this curious case must have been as follows:—The blood entering the right auricle by the two cavæ, passed almost entirely into the left ventricle, a small portion probably finding its way into the left auricle. A part of the blood would pass during the diastole of the ventricles from the left into the right ventricle, and be propelled through the lungs, to be returned into the left auricle. The blood itself would constantly remain in a state very little oxygenated, as the portion returning from the lungs would be mixed with the returned venous part, before being propelled into the aorta.

The accompanying sketch (Plate I) may serve to explain the appearances:—

- (a) The pericardium held up by pins.
- (b) Part of internal surface of aorta with orifice of one of the coronary arteries.
- (c) The left auricle.
- (d) The left ventricle, crossed by a probe placed under the columnæ carneæ and cordæ tendineæ.
- (e) A part of the right ventricle, with the sides separated by a piece of whalebone.

- (f) The remaining part of the right ventricle. To this portion the pulmonary artery remained attached.
- (g) A probe passed through the oval opening between the two ventricles.
- (h) The passage from the left ventricle into the right auricle which was as large as the left auricular orifice.
- (k) The parietics of the left ventricle.

In the clinical history given interesting points are,—the relatively slight cyanosis that seems to have existed; it is spoken of only as “a peculiar blueness of the cheeks and lips, more remarkable at one time than another;” and the fact that the patient attained the age of 22 years in fairly good health and with apparently active habits. I find however a fair number of cases recorded of cor triloculare where patients have lived to a fairly advanced age.

Professor Ewald of Berlin¹ gives a case of cor triloculare biventriculare where the patient died at the age of 42 years.

Max Mann² gives a case of cor triloculare *biatriatum* dying at 22 years from a glioma of the brain, a quite independent affection.

In this report it is also very interesting to compare the keen observation which Dr. Holmes brought to bear on all the details of his case (noting fluctuation, signs, of effusion, pulse, bubbling in the chest, etc.), his close connotation of the sequence of events, his skilled post mortem technique, with an entire absence of those methods of physical examination which it would seem to us in the light of our present day knowledge almost must suggest themselves to one who was studying his case so closely. But in matters even of the purest observation suggestion seems needed to lead the way. In this connection Dr. Holmes' own words, spoken some 25 years later, in his *Valedictory address to the students of the medical faculty of McGill University* in 1851, are very striking. He says:—It is rather humiliating to look back into the history of medicine and to see the neglect of great discoveries and frequently the opposition to the introduction of great improvements. The case of Inoculation and more recently of Vaccination, may serve to show the one and the long neglect of Percussion as a means of diagnosis of diseases of the heart, the other. It was about the middle of last century that Auenbrugger published his important discovery and it was not till it was recommended by Corvisart many years after the present had commenced (in 1808) that its value became generally known.....

* * * * *

...I shall only finally allude to the vast improvement introduced

¹ Berl. Clin. Woch. 1898 XXXV. P. 1094.

² Ziegl. Beitrag, bd. VI., p. 487

into practical medicine by the conjoined operations of auscultation and percussion. It is now about 30 years since Laennec first announced his great discovery to the French Academy and it is much less since the practice of auscultation became general. Like most improvements it met with opposition at its first introduction; but this has now quite disappeared and its only obstacle is that which it shares with all other objects of pursuit, the labor necessary for acquiring expertness in its application."

The heart as it appears to us to-day as a museum specimen presents the following appearances:—

An adult heart of medium size, broad at the base and somewhat shorter than normal from the auricular-ventricular groove downward. The apex is blunt and rounded; the auricles have been opened in the usual way and show no anomalies of the entering veins. The right auricle is largely dilated and somewhat hypertrophied and there is a slit-like opening of the foramen ovale. The ventricular portion has been opened by an incision on its anterior surface through the aorta to the apex. This reveals a large roomy cavity occupying the whole inferior part of the heart and a small triangular cavity situated at the right upper angle of the larger cavity and in front of the aorta.

The larger cavity, which is called by Dr. Holmes 'the left ventricle', has four openings: (1) the tricuspid, communicating with the right auricle, guarded by the tricuspid valve (and described by Dr. Holmes as "the preternatural orifice between the left ventricle and right auricle, furnished with valves similar to the tricuspid.") (2) The mitral communicating with the left auricle and guarded by the mitral valve. (3) The aorta which rises behind and posteriorly in the median line. It is normal in direction and position but of slightly diminished calibre. (4) A diamond shaped opening with tendinous edges, not valvular in character, just below and to the right of the aortic valves and above the tricuspid, which leads into the smaller triangular cavity situated at the right upper anterior angle of the heart.

The only sign in the larger chamber of an interventricular septum, separating the venous from the arterial heart, is a *small muscular cushion at the extreme upper part of its posterior wall* which projects forward less than half an inch between the tricuspid and mitral valves which lie on either side of it.

The walls of this ventricle are about half an inch thick and the papillary muscles are very strong, especially on the left side.

The small triangular cavity situated above and to the right is called

by Dr. Holmes 'the right ventricle;' it has two openings: (1) it gives off the pulmonary artery; (2) and it communicates with the left ventricle by the diamond shaped opening which has been described above. The two cavities are separated from each other by a muscular septum over a quarter of an inch thick, which is perforated by the diamond-shaped opening at its inner end.

The *pulmonary artery* is of good size and slightly larger than the aorta in front of which it crosses from right to left; it shows no sign of disease.

At first sight this smaller cavity appears like a pouch in the wall of the ventricle, or the conus arteriosus of the pulmonary artery cut off from the right side of the main body of the common ventricle. And the anomaly before us might be considered to be two-fold:—(1) a total defect of the interventricular septum producing a *cor biatrum trilobulare*, a fairly common congenital anomaly. (2) A supernumerary ventricle, produced by the cutting off of the conus arteriosus of the pulmonary artery by an anomalous septum such as was described by Dr. Stephen Mackenzie in speaking of a heart with three ventricles as "An exaggeration of the folds of the muscular columns to which the tricuspid valves are attached."*

Considering the matter, however, from an embryological standpoint a simpler explanation of the facts seems to suit the case better. It is one which seems to have suggested itself to Dr. Holmes also, judging by his nomenclature. For he calls the large chamber receiving venous and arterial blood from both auricles, the *left* (and not a common ventricle) and the small chamber, giving off the pulmonary and having no communication with the auricles, the *right* (and not a supernumerary) ventricle.

The interventricular septum it will be remembered is developed in early fetal life from three directions, the *septum inferius*, which grows up from the posterior wall near the apex; the *septum intermedium*, which is a prolongation downward and forward of the *interauricular septum*; and the *septum superius*, a continuation downward of the aortic septum, which forming within the aortic bulb has divided the aorta from the pulmonary artery. The septa thus derived from below, above and posteriorly, unite to form the interventricular septum not far from its upper border. The point of union remains the weakest part of this septum throughout life and is known in the adult heart as the *pars membranacea* or "undefended space."

In our specimen the *aortic septum* has fully developed, the aorta and

* Trans. Path. Socy of London, Vol. 33.

pulmonary arteries being in their normal relations, and perfectly formed. The aorta is moreover shut off from the chamber giving off the pulmonary by a fully developed muscular wall. The *septum intermedium* is apparently represented by the small muscular cushion projecting forward into the ventricle between the mitral and tricuspid valves.

Let us suppose that at a very early period of foetal life the *aortic septum* had been continued downwards either to meet the *septum inferius*, or, that being defective, to meet the opposite ventricular wall, while the *septum intermedium* failed to close in and complete the division of the cavity. There would have thus resulted a chamber giving off the pulmonary partially cut off from a chamber giving off the aorta and also receiving blood from both the auricles. This latter chamber, which may be considered (in Dr. Holmes' own words), the left ventricle, having thus a great excess of work to do, would have grown much more rapidly than the other. And the wall cutting off the small cavity containing the pulmonary artery would, in the subsequent growth of the heart, have been carried round to the side of the greatly enlarged left ventricle and out of all relation to the *septum intermedium* between the mitral and tricuspid valves. And exactly the appearances seen here would have been produced.

Three plates accompany this paper:

Plate I. is a reproduction of a fine copper-plate engraving published by Dr. Holmes with his paper in the *Trans. of the Edinburgh Med. Chir. Soc.*, 1824, and apparently taken from a drawing made at the time. The lettering is his own and is explained at the end of his text.

Plate IIa and Plate IIb represent two photographs kindly taken by Dr. Patrick of the heart as a museum specimen and show the interior of the two ventricles and the large arteries. Glass tubes project through the mitral and tricuspid orifices and through the diamond shaped opening between the ventricles.

Plate III. is a diagrammatic sketch of the heart to show the mixed course of the blood and the relation of its cavities. It will be seen that no chamber contains pure arterial blood, that entering the left auricle from the lungs meeting with a stream of venous blood through the foramen ovale. For this sketch I have to thank Dr. R. Tail Mackenzie.

List of Dr. Holmes' writings accessible in the McGill Medical Library: Those papers which have seemed to me especially valuable I have underlined.

1. *Case of Malformation of the Heart.* Trans. of the Med. Chir. Soc. of Edinburgh, 1824.

2. *On Fleishy Tumours of the Uterus with Abscess of Ovarian, Rupture and Fatal Peritonitis.* British American Journ., 1845, Vol. 3, p. 87.

3. *On Gunshot Wound of the Heart with Perforation of the Pericardium.* Brit. Amer. Journ., 1846, Vol. 1, p. 227.

4. *On Obstruction of the Appendix Vermiformis and on Post Mortem Appearances in Peritonitis.* Brit. Amer. Journ., Vol. 2, p. 285.

5. *Remarks on Dr. Nelson's Communication re the Champeau Case of Peritonitis.* Montreal Medical Gazette, 1844, p. 199.

6. *On the Employment of Chloroform,* Brit. Amer. Journ., 1847-48. (Reporting a case where he claims chloroform was used for the first time in this Province.)

7. *Valedictory Address to the Students of McGill Medical Faculty,* 1851. Brit. Amer. Journ., Vol. 6, p. 51.

8. *Valedictory Address to Graduates in Medicine,* *ibid.*, 1854, p. 1.

9. *Case of Heart Disease.* Montreal Med. Chron., 1855, Vol. 2.

10. *Fatal Jaundice.* *ibid.*, Vol. 3, p. 281.





PLATE I





PLATE II A.





PLATE II b.



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